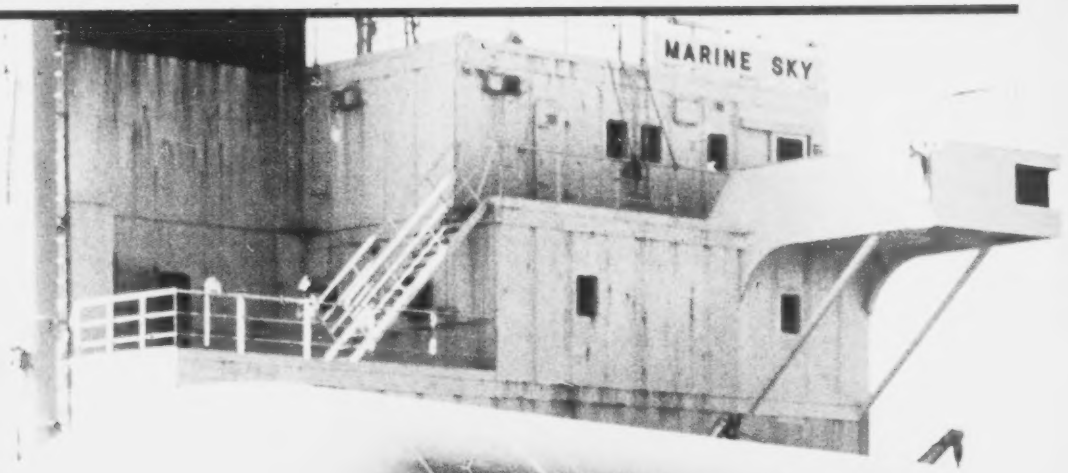
CHEMICAL & ENGINEERING NEWS

C&EN

APRIL 6, 1992

RESEARCH ILLUMINATES MECHANISM OF HUMAN COLOR VISION PAGE 27



U.S. VIEW OF NORTH AMERICAN FREE TRADE AGREEMENT

PAGE 7

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CHEMICAL & ENGINEERING NEWS

C&EN

APRIL 6, 1992

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- National Science Foundation readies program to help scientists perform basic research in former Soviet Union. Page 5
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COVER: U.S. Customs officers inspect chemical shipment at Houston dock. Photo by Billy L. Mason, U.S. Customs Service

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Alfred Bader, founder of Aldrich Chemical, says he is being forced off the board of Sigma-Aldrich and shorn of his roles as unpaid "ambassador" and consultant. Page 39

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Committee on Professional Relations is concerned that its mass termination reports are understating the seriousness of unemployment among chemists, particularly older ones. Page 44

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1155—16th St., N.W., Washington, D.C. 20036

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Published by
AMERICAN CHEMICAL SOCIETY
(202) 872-4600; TDD (202) 872-4432
John Kistler Crum, Executive Director
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Subscription Rates 1992: Printed editions: nonmembers U.S. 1 yr. $105, 2 yr. $189; outside U.S. 1 yr. $141, 2 yr. $261. Air freight rates available on request. Rates above do not apply to nonmember subscribers in Japan, who must enter subscription orders with Maruzen Co. Ltd., 3-10 Nihonbashi 2-chome, Chuo-ku, Tokyo 103, Japan. Tel: (03) 272-7211. Single copies: Current $15. Rates for back issues and volumes are available from Microforms & Back Issues Office, ACS, 1155—16th St., N.W., Washington, D.C. 20036. Back and current issues available on microfilm and microfiche. Rates on request from Microform Program, ACS.

Chemical & Engineering News (ISSN 0009-2347) is published weekly except for the last week in December by the American Chemical Society at 1155—16th St., N.W., Washington, D.C. 20036. Second-class postage paid at Washington, D.C., and additional mailing offices. POSTMASTER: Send address changes to Chemical & Engineering News, Membership & Subscription Services, P.O. Box 3337, Columbus, Ohio 43210. ACS assumes no responsibility for the statements and opinions advanced by the contributors to its publications.

Advertising Management: CENTCOM LTD.
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LETTERS

Survey of chemists

The following letter from International Union of Pure & Applied Chemistry president Allen J. Bard invites chemists to offer their advice and recommendations on projects that might be addressed within IUPAC programs.

Dear chemist: Each year the various commissions and committees of IUPAC undertake many projects. In general, these projects are related to the needs of world chemists and the role of chemistry in meeting the needs of humankind. These often deal with problems of nomenclature, symbols, terminology, and conventions. They also include critically evaluated data compilations, recommended measurement procedures and analytical methods, recommended standards, and guidelines for publication.

Although the various bodies of IUPAC contain chemists who are very knowledgeable in their specialties, it is clearly not possible to cover the full breadth of chemistry within the limited membership of the union. Thus, there may be important problems and projects suitable for IUPAC study that are not undertaken in a timely manner. We are therefore soliciting the chemistry community through chemistry journals and magazines for advice and recommendations on projects that might be addressed within IUPAC programs. If you know of such projects, please send a suggested project title, a brief description of the nature of the problem, and the names and addresses of suggested experts in the project area to Michael Freemantle, IUPAC Secretariat, Bank Court Chambers, 2-3 Pound Way, Templars Square, Cowley, Oxford OX4 3YF, U.K. Thank you for your advice and interest.

Allen J. Bard

Reversing the ban on EBDCs

A brief news item (C&EN, Feb. 24, page 6) indicates that the Environmental Protection Agency now permits the sale of ethylenebis(dithiocarbamates), or EBDCs, an important class of agricultural chemicals. To some, EBDCs were suspect because, as used, they release a small amount of ethylene thiourea (ETU).

We were the first to report that chronic administration of 350 ppm ETU in the diet of male and female rats induced goiter in the thyroid (hyperplasia) and thyroid carcinoma [*J. Natl. Cancer Inst.*, **49**, 583 (1972)]. A much lower yield of cancer of the thyroid was obtained with 175 ppm ETU. ETU and other thioureas act as goitrogens, leading to thyroid-pituitary hormone imbalances. Thus, the carcinogenic effect is due to such imbalances, accounting for the steep drop in effect with only a 50% lower dose.

Trace amounts of ETU, a nongenotoxic agent, insufficient to affect hormone balances, would not be expected to cause cancer. No case of thyroid cancer was found in workers in the rubber industry with probable exposure to a higher amount of ETU than would be derived from EBDCs [*IARC Monogr. Supp.*, **7**, 207 (1987)]. The high-level ETU in rats is effective because it acts as a goitrogen. Certain vegetables, like cabbage, also contain goitrogens, without obvious harm in populations with an adequate dietary iodide intake. Thus, the initial ban of EBDCs failed to take into account the mechanism of action of ETU. The staff of EPA needs to be congratulated that they have now taken the proper action, based on the relevant mechanism.

John H. Weisburger
American Health Foundation
Valhalla, N.Y.

Perfluorocarbon flammability

I would like to comment on the letter by Eric Larsen (C&EN, Feb. 17, page 3) in which the topic of perfluorocarbon flammability is discussed. The general subject of material flammability in oxygen has been presented in numerous papers at symposia sponsored by the American Society for Testing & Materials G.04 committee, which is concerned with flammability and sensitivity of materials in oxygen-enriched environments.

An issue with the polymer polytetrafluoroethylene (PTFE) is that it contains no appreciable volatiles as a result of the high number average molecular weight, which is typically 10^6 g per mole or more. It has a melting point, typically, of 327 °C and degradation products (measured with TGA and FTIR in oxygen) are detectable at approximately 400 °C and above (CO, CO_2, COF_2, and CF_4) [Tapphorn, R.M., Shelley, R., Benz, F., "Test Developments for Polymers in Oxygen-Enriched Environments," in "Flammability and Sensitivity of Materials in

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U.S. Chemical Industry Supports North American Free Trade Pact

With its focus on Mexico, industry wants the most liberal trade and investment rules possible; particular goal is strong agreement on petrochemicals

Earl V. Anderson, C&EN Northeast News Bureau

Negotiators struggling with the many complex and difficult issues involved in fashioning a North American Free Trade Agreement (NAFTA) may or may not finish their job by the middle of the month as hoped.

An agreement, linking Canada, Mexico, and the U.S. in a massive free trade area may or may not reach Congress this year —an election year in which trade has emerged as an important political issue. And when, or if, the agreement does reach Congress, it may or may not generate enough support to win approval.

Speculation and conjecture are rampant. There are no sure bets—one way or the other. What is certain, however, is that the chemical industries in all three countries have a lot riding on the outcome of the negotiations.

In previous issues, NAFTA was examined from the Mexican chemical industry point of view (C&EN, Sept. 9, 1991, page 7) and from the Canadian perspective (C&EN, Jan. 27, page 9). This final article of the series presents the U.S. chemical industry position on NAFTA.

The regional trade bloc bound by NAFTA, stretching from the Yukon to the Yucatan, would be one of the biggest and richest markets in the world—a single bloc with a $6 trillion annual output encompassing 360 million consumers.

For a globally oriented industry such as the U.S. chemical industry, that is reason enough to command attention. And there is no doubt that the industry is paying very close attention to developments in the NAFTA negotiations. Like its counterparts in Canada and Mexico, it has a lot riding on the outcome.

Last year, total chemical trade among the three countries was almost $14.5 billion. All but a pittance involved U.S. chemical exports or imports. U.S. chemical exports to Canada and Mexico last year hit $9.3 billion, almost 22% of all the chemicals it exported. The U.S. imported more than $5 billion in chemicals from the two countries, which is about 21% of total chemical imports.

Canada, in fact, is the U.S.'s largest chemical export market. Mexico is the third largest. And the U.S. imports more chemicals from Canada than any other country, with Mexico ranking a respectable seventh. Just as important, chemical exports to both Canada and Mexico have grown faster than total chemical exports over the past few years.

Since 1988, for instance, U.S. chemical exports to Canada have increased an average 16% per year, and to Mexico, 13%, whereas total chemical exports have grown an average 11%. And although growth of chemical imports from Canada has trailed the average, imports from Mexico have been growing more rapidly.

Little wonder, then, that the U.S. chemical industry has a vested interest in the NAFTA negotiations. And it's probably safe to say that U.S. chemical companies are more preoccupied with what Mexican negotiators bring to the bargaining table than with what the Canadians bring.

This is no slight on Canada. Far from it. U.S. chemical industry trade with and investment in Canada dwarfs its business with Mexico. It's just that for the past three years the U.S. and Canada have had a free trade agreement.

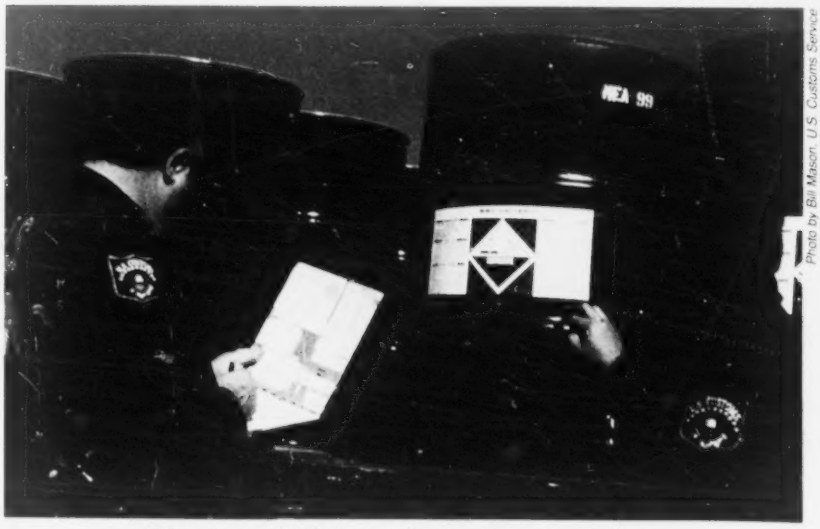
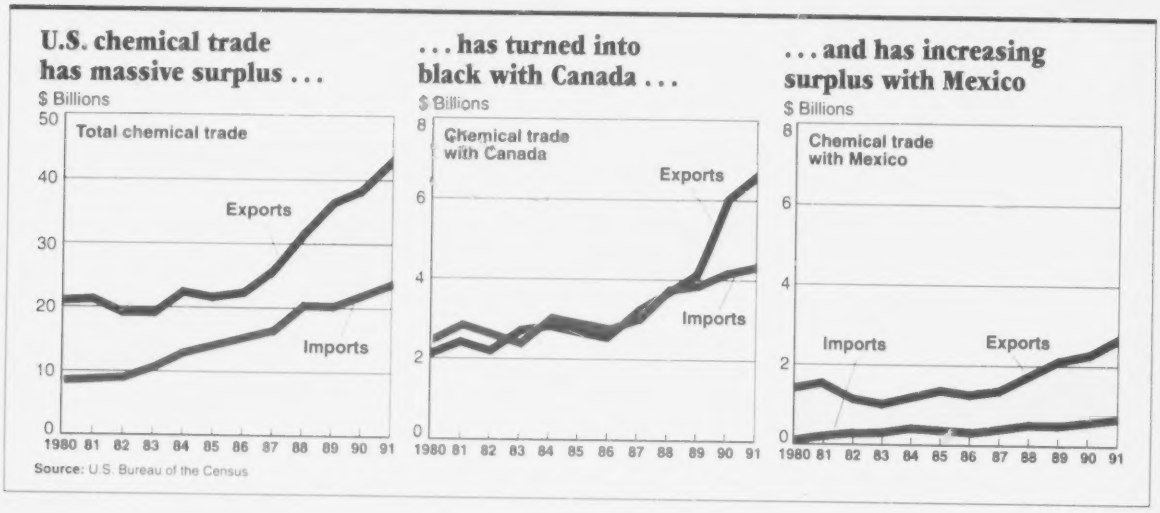


Photo by Bill Mason, U.S. Customs Service

U.S. customs officials inspect chemical drums at port of entry


U.S. chemical trade has massive surplus . . .
$ Billions
Total chemical trade
Exports
Imports
. . . has turned into black with Canada . . .
$ Billions
Chemical trade with Canada
Exports
Imports
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Chemical trade with Mexico
Imports
Exports
1980 81 82 83 84 85 86 87 88 89 90 91
Source: U.S. Bureau of the Census

The U.S. chemical industry believes the current agreement has some shortcomings. The industry would like to see some parts improved, and it would like to see some things added in the NAFTA negotiations, if possible. And certainly it doesn't want to see NAFTA weaken the present free trade agreement in any way.

But the industry has supported the Canada-U.S. trade agreement and generally has benefited from it. Since it became effective Jan. 1, 1989, U.S. chemical exports to Canada have increased 78%.

From its very conception, the industry also has been a strong supporter of NAFTA. But, as with the current trade agreement, that support doesn't come without some caveats.

For most of the U.S. chemical industry, those caveats are contained in a policy statement that the Chemical Manufacturers Association (CMA) issued last June. It outlines CMA's positions on most of the issues that are important to the chemical industry. Among them: petrochemicals and petrochemical feedstocks, investment, tariffs and nontariff barriers (together called market access), intellectual property rights, and rules of origin. Some of these were dubbed sticky issues when the negotiations began. And they remain sticky issues in the NAFTA negotiations.

The bottom line: Nail down the most liberal trade and investment conditions possible. But CMA's policy statement doesn't cast the industry in cement. K. James O'Connor Jr., CMA's associate director of international trade, notes the statement features the word "should," not "must." And certainly not every U.S. chemical company agrees with every dotted *i* and crossed *t*. Nevertheless, the CMA policy statement pretty well defines what the U.S. chemical industry wants to see emerge from the negotiations.

What it wants to see emerge as much as anything is a strong agreement on petrochemicals. Even before the negotiations began, petrochemicals surfaced as a sensitive political issue. It still is.

The reason is Mexico's constitution, which reserves dealing in oil, natural gas, and some petrochemicals exclusively for Petróleos Mexicanos (Pemex), the state-owned energy and petrochemical monopoly. This effectively divides that country's petrochemical industry into two sectors—public and private.

The public sector, incarnate in Pemex, oversees production of those petrochemicals on a list of "primary," or basic, petrochemicals. Over the years, that list has been pared considerably. Many products that once were classified as primary have been reclassified. In 1986, Mexico erased 36 products from its primary list. In 1989, it cut the primary list further, from 67 to only 20 products. Since then, methyl *tert*-butyl ether, the increasingly popular gasoline additive, has been taken off. The list now contains 19 key petrochemicals. These products are off-limits to private companies—domestic or foreign.

The private sector can produce all other petrochemicals. However, Mexico has another list of 66 "secondary" petrochemicals on which foreign direct investment is restricted to 40%. Foreign investment is unrestricted for petrochemicals that do not appear on either list.

The U.S. chemical industry's concerns about petrochemicals are twofold: petrochemical investment and access to petrochemical feedstock and raw materials in Mexico. The two are closely interrelated. U.S. chemical companies interested in producing in Mexico want assured access to petrochemical feedstock. They want to be able to produce in Mexico petrochemicals that the law now does not allow. And they want no restrictions on their ability to invest anywhere along the petrochemical chain.

The reasons are obvious: the more secure the supply of feedstock, the better. In addition, most large-scale petrochemical operations are more profitable when they are vertically integrated. Any break in the integration chain eats into profitability. And, although its record is improving, Pemex has earned a reputation as an unreliable supplier of petrochemicals to its downstream customers.

However, the oil, natural gas, and petrochemicals that the Mexican constitution reserves for Pemex are an emotional national symbol for most Mexicans. Ever since Lázaro Cárdenas, one of Mexico's most revered presidents, nationalized the oil industry in 1938, Mexicans have regarded their right to sole ownership as a matter of faith.

In Mexico, to tamper with these constitutional provisions is like walking on political eggs. In the U.S., although there are some who say that these provisions are open to interpretation, most chemical executives involved in the NAFTA negotiations say that they are well aware of and respect Mexico's sensitivity on the issue.

Nevertheless, CMA's policy statement says a NAFTA based on a "free market system" will bring the greatest benefits to both Mexican and U.S. chemical companies. It says private companies, both Mexican and foreign, should be provided access to crude oil, natural gas, and other natural resources. It also says production restrictions on primary and secondary petrochemicals should be eliminated. And, according to the policy statement, preferential fees or taxes on chemical raw materials should gradually be reduced to zero.

The operative word is "should." Says CMA's O'Connor: "You have to be flexible in any negotiation. If we paint ourselves into a corner on any single issue, then we're forced to reject the agreement if it doesn't meet our demands, even if the total package is beneficial." You can't be rigid and come out a winner, he adds.

Some U.S. chemical companies may have their own "wish lists" of petrochemicals that they would like to see opened up to foreign investment and production in Mexico. Each of their lists is geared to what they see as niche opportunities. But, to remain flexible, the chemical industry's private-sector advisers to U.S. trade officials haven't developed a firm position on just how much of Mexico's lists of restricted petrochemicals should be eliminated. One adviser, not speaking for attribution, asks what is gained if all the petrochemicals are decontrolled and Pemex still retains sole control of oil, natural gas, and naphtha? His answer: not very much.

However, O'Connor thinks there's not much sense in demanding that Pemex be privatized. It's one thing for the U.S. and Canada to present Mexico with a package of "what we see as goals." It's another, he adds, to tell Mexico how to do it and how far to go.

In effect, the pivotal issue on petrochemicals may not be so much one of ownership, but of access—secure, reliable, and sufficient access to feedstocks at nondiscriminatory, world market prices. Indications are that, if U.S. negotiators could get that secured access to feedstocks and a significant reduction in the restricted petrochemical lists, the U.S. chemical industry could live with it.

Fernando Arozena, a trade attorney for Dow Chemical who also chairs CMA's NAFTA task force, says Dow doesn't want to make it a big issue. "We recognize and appreciate the peculiarities and restrictions of the Mexican system, but don't regard them as a major concern."

Of course, the Mexican chemical industry and Mexican negotiators have their own ideas about the petrochemical sector negotiations. And because no agreement is in sight yet for the sector indicates that Mexico and the U.S. are still at odds on this issue. As one chemical trade adviser puts it, "The main lightning rod for our industry hasn't even been drafted yet."

Larry Gess, marketing manager at Nalco Chemical who also is on the staff of the Office of the Chemical Industry Trade Adviser (OCITA), says there has to be an intersection along the petrochemical chain somewhere. "But frankly," he says, "I don't know where that intersection is going to come."

One chemical expert close to the negotiations believes the petrochemical issue could be solved easily. All it would take is for Mexico to allow the private sector, including foreign companies, to produce petrochemicals, starting with ethylene and propylene, and continuing down the petrochemical chain. That would satisfy the big U.S. petrochemical producers, help the Mexican chemical industry at the same time, and send a signal to the others that Mexico is serious about an open-market system.

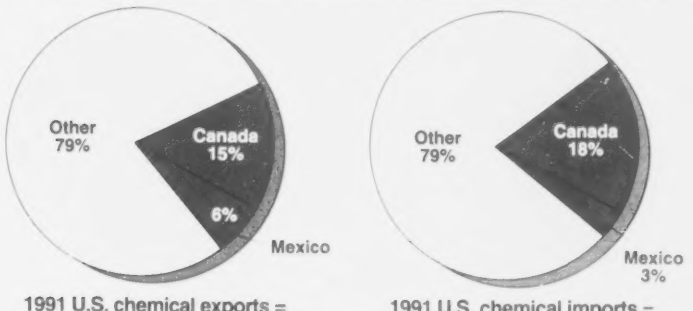
This petrochemical issue is a two-headed creature. Although it is being negotiated in the energy group, petrochemicals also spill over into the NAFTA group handling investments. That's because Mexico prohibits private investment of any kind on those 19 primary petrochemicals reserved for Pemex.

There are some in the U.S. chemical industry who say that if those restrictions are slimmed down to their satisfaction, the entire investment issue would automatically be resolved to their satisfaction as well. Others say that it is not quite that simple.

For instance, Mexico limits foreign investment for the 66 petrochemicals on the secondary petrochemical list to a maximum of 40%. And, although U.S. companies can actually own more than the legal 40% through a financial sleight of hand known as investment trusts, most U.S. chemical trade advisers would prefer to see an end to all restrictions that limit or prohibit full foreign ownership in Mexico. That's what CMA's policy statement also calls for.

CMA also wants the same rights and protection as Mexican investors, both private and public. In other words, "national treatment." There should be no minimum domestic content requirements or export performance requirements placed on for-

U.S. chemical trade more with Canada than with Mexico



Source: U.S. Bureau of the Census

eign investment. And U.S. chemical companies should have an unrestricted right to repatriate capital and remit profits. With 1938 still clear in its memory, CMA also has established guidelines for expropriation. Chief among them is that expropriations not only be limited to standards of international law, but also include that they be only for public purposes, nondiscriminatory, and accompanied by payment or prompt and adequate compensation at fair market value determined by international arbitration.

U.S. chemical industry trade experts unanimously give Mexico high marks for the progress it has made in opening its economic doors to foreign investment. However, they do have some reservations. For instance, the underlying law governing foreign investment in Mexico remains unchanged. Instead, Mexico liberalized foreign investment through decrees and regulations. More than a few in the U.S. chemical industry fear that a different administration in Mexico could interpret the law differently and change the existing regulations.

"In a nutshell," says one industry trade expert, "we want Mexican investment laws to be as close as possible to U.S. investment laws." Yet, there are some in the chemical industry who think that the investment issue is being blown out of proportion. They say that seeking completely unrestricted chemical investment in Mexico is like jousting with windmills. All too often, they point out, foreign operations of U.S. companies are much more successful when they are joint ventures with local partners.

Whatever investments Dow may make in Mexico, says Arozena, will not depend on the shape of the investment agreement that comes out of NAFTA. They will depend, instead, much more on market conditions.

The investment issue is another example of putting the focus on Mexico in the NAFTA negotiations. But in the real world, the action is in Canada. The book value of U.S. direct investments in Canada's chemical industry was $6.4 billion at the end of 1990. In Mexico, it was much less—only $1.6 billion.

In any trade negotiation, tariffs rank high on the list of concerns for the U.S. chemical industry. The NAFTA negotiations are no exception. And for these negotiations, the industry thinks that the U.S.-Canada free trade agreement can serve as an excellent guide.

The industry believes that NAFTA should make it possible for the three countries to eliminate tariffs on chemicals in one of three ways: immediately, in stages over a period no greater than five years, or over a longer period of time for import-sensitive items. That's how it's done under the U.S.-Canada trade agreement and how the U.S. chemical industry proposes it be done in the Uruguay round of multilateral trade negotiations in Geneva, sponsored by the General Agreement on Tariffs & Trade (GATT).

The current trade agreement also makes it possible to accelerate staged-tariff cuts. And CMA believes NAFTA should do the same, as long as no producer in any of the three countries objects. There's some dissatisfaction with the current trade agreement on this score, because one inconsequential producer can block an accelerated tariff cut that all of the major producers want. U.S. chemical producers want to see this corrected in the NAFTA tariff negotiations. To do this, the tariff agreement should establish specific criteria for raising objections to accelerated tariff cuts.

U.S. is chemical-producing heavyweight of the three countries

Thousands of metric tons	1990 production				
	U.S.	Canada	% of U.S.	Mexico	% of U.S.
Sulfuric acid	40,171	3311	8.2%	3974	9.9%
Ethylene	17,001	2425	14.3	1370	8.1
Ammonia	15,386	3602	23.4	2632	17.1
Sodium hydroxide	10,605	1651	15.6	429	4.0
Propylene	10,037	766	7.6	366	3.6
Chlorine	9,925	1542	15.5	387	3.9
Benzene	5,380	765	14.2	320	5.9
Methanol	3,624	1884	52.0	210	5.8
Toluene	2,767	427	15.4	368	13.3
Xylene	2,586	514	19.9	404	15.6
Butadiene	1,433	192	13.4	21	1.5
Carbon black	1,302	178	13.7	125	9.6
Polyethylene, low density	5,071	1167	23.0	348	6.9
Polyethylene, high density	3,778	364	9.6	176	4.7
Polystyrene	2,273	215	9.5	130	5.7

Sources: U.S. Bureau of the Census; U.S. International Trade Commission; Statistics Canada; Asociacion Nacional de la Industria Quimica

One key element of the industry's position is that for petrochemicals, the staging time—that is, the length of time it takes to completely eliminate tariffs—should be the same for all three countries. "Symmetrical staging," O'Connor calls it. The reasoning is that, because the petrochemical industries in all three countries have a similar level of technical sophistication, the staging time to eliminate tariffs should be the same.

It's a position that doesn't sit well with the Mexican chemical industry. It believes that, because Mexico's level of economic development lags that of the U.S. by a wide margin, it should receive longer staging periods. This would allow Mexico time to adjust to the new stiff breeze of competition. On this, "we (the Mexican and U.S. chemical industries) agree to disagree," says O'Connor. Nor has this issue been settled yet in the NAFTA negotiations.

The chemical industry, through CMA, has told U.S. negotiators that the tariff agreement also should include a deadline for compliance and specific penalties if one country fails to comply with the agreement "on a continuing basis." If that were the case, says CMA, the injured party should be able to reimpose its "most-favored-nation" tariff rates.

After joining GATT in 1986, Mexico reduced many of its tariffs and "bound" them so that they cannot be raised. Since then, it has reduced tariffs even further, but these lower "applied" rates are not bound. Naturally, the U.S. chemical industry wants these lower Mexican applied rates to be the basis from which staged tariff reductions occur in NAFTA.

More than 40% of the chemicals that the U.S. imports from Mexico come into the country duty-free under the Generalized System of Preferences (GSP). For several chemical sectors, the percentage is well over 70%.

Under the GSP program, the U.S. grants duty-free treat-

U.S. chemical trade patterns with Mexico, Canada differ

$ Millions	1991 U.S. chemical exports to Canada	Mexico	Total	1991 U.S. chemical imports from Canada	Mexico	Total
Organics	1133	710	11,073	757	249	8,157
Inorganics	508	260	4,160	1025	182	3,299
Dyeing, tanning & coloring materials	487	114	1,660	176	26	1,416
Medicinals & pharmaceuticals	562	121	4,677	118	18	3,053
Essential oils, toilet & polishing preps	532	120	2,430	190	52	1,417
Fertilizers	200	52	2,996	723	15	919
Plastics, primary form	1275	608	7,570	609	44	1,930
Plastics, nonprimary form	768	357	2,817	452	80	1,855
Other	1219	314	6,099	302	55	2,123
TOTAL	6684	2656	43,482	4352	721	24,169

Source: U.S. Bureau of the Census

Mexico's 'primary' petrochemical list

In Mexico, only Petróleos Mexicanos (Pemex) can produce the products on the "primary" petrochemicals list. The U.S. chemical industry would like to see that list abolished, or at least shortened. Mexico's "primary" petrochemicals:

- Ammonia
- Benzene
- Butadiene
- Dodecylbenzene[a]
- Ethane
- Ethylene
- Heptane
- Hexane
- Methanol
- *n*-Paraffins
- Pentanes
- Propylene
- Propylene tetramer
- Raw material for carbon black
- *tert*-Amyl methyl ether
- Toluene
- Xylenes
- *o*-Xylene
- *p*-Xylene

a From propylene tetramer. Source: Asociación Nacional de la Industria Química

ment to certain imports from qualified developing countries. Mexico is one of those countries.

If NAFTA eliminated tariffs on all chemicals immediately, GSP would be meaningless for Mexican chemical exports to the U.S. But tariffs on all chemicals certainly won't be eliminated immediately under NAFTA and, until they are, GSP will continue to be an issue.

Mexico undoubtedly will fight to retain its GSP privileges. But Mexico imposes significant tariff barriers on some chemicals, particularly resins, that are eligible for GSP. Noting this, CMA thinks that tariffs on these products should be harmonized immediately.

It is on the tariff issue, however, that there is less harmony within the U.S. chemical industry than there is on most other issues. Many small companies with labor-intensive batch operations think their concern about tariffs isn't getting the kind of attention it deserves from the industry's leading trade spokesmen. The spotlight, they say, is on petrochemicals, investment, intellectual property—"things the big boys want." Meanwhile, the problems of small, batch-type operators go by the boards. It's one of the very few areas in the chemical industry in which Mexico is perceived to have a competitive advantage.

David S. Alcorn, former president of the dyes and chemicals division of Crompton & Knowles and now the company's spokesman on tariff matters, says that, over the past 20 years, many U.S. companies with batch operations have been wiped out by imports. This has meant lost jobs, but the impact is hidden in the overall trade surplus that the chemical industry consistently racks up.

The problem is particularly acute for the few remaining U.S. companies that produce dyes and pigments—products contained in chapter 32 of the Harmonized Tariff System. And, as NAFTA negotiations progress, these companies have their attention focused on the dyes and pigments plants that already are operating in Mexico.

V. M. (Jim) DeLisi, vice president of Fanwood Chemical, in Fanwood, N.J., notes that these dyes and pigment plants in Mexico are not "Mexican" plants, but are predominantly owned by subsidiaries of European multinationals. "They are looking at NAFTA as a possible way to expand in Mexico at the expense of U.S. companies," he says.

Consequently, the batch-process companies in the U.S. want a longer phase-in period for tariff cuts on their import-sensitive products. This is not surprising. Traditionally, dyes and dye intermediates have been listed as import-sensitive products at trade negotiations, including the ongoing Uruguay round of trade talks.

But DeLisi, who also is chairman of the international trade committee of the Synthetic Organic Chemical Manufacturers Association (SOCMA), is concerned about how many products will be allowed on the import-sensitive list, and he's looking for a 15-year phase-in period for Chapter 32 products. CMA's policy statement on tariffs does call for a longer phase-in period for import-sensitive products. But it doesn't specify how long. For the Uruguay round, the industry has suggested a maximum 15-year period for phasing in tariff cuts on import-sensitive chemicals.

To DeLisi, tariffs are not a stand-alone issue. "You have to consider the relationship between tariffs and regulations," he says. And he doesn't mean just environmental regulations, but health and safety regulations, labor regulations—"the whole ball of wax."

It costs money to comply with stringent regulations. And in Mexico, says DeLisi, dyes and pigments plants operate under environmental and other regulations that are nowhere near as stringent as those in the U.S. He believes that these regulatory issues must be addressed in the environmental and labor negotiations that "parallel" the NAFTA negotiations on trade. In the meantime, the phase-in period for eliminating tariffs on these batch products should be as long as it takes for Mexico to bring its regulations up to par with U.S. regulations.

It doesn't surprise DeLisi that the Mexicans are pushing very hard to get favorable tariff treatment in NAFTA for

these Chapter 32 products. And it's no surprise that he and his colleagues are working just as hard to see that these products are treated "fairly" during the negotiations.

Because Canada produces very few of these products, the U.S.-Canada trade agreement was a "nonevent," says DeLisi. Consequently, little was heard from this industry. NAFTA, however, is a "serious" event and the remaining U.S. batch operators are treating it as such. And the way to treat it, says DeLisi, is to link tariff with regulations.

Much of that effort will come through SOCMA, some of whose members are the small companies that use batch processes. But Susan Kernus, SOCMA's manager of government relations, emphasizes that this does not put the association at odds with the rest of the chemical industry about NAFTA. SOCMA is a member of OCITA, as is CMA. And SOCMA, she says, has been a strong supporter of NAFTA, along with the rest of the industry. In this case, it's just a question of emphasis, she says.

One link that is important to the chemical industry is that between tariffs and nontariff barriers. In the Uruguay round, the industry has stressed that there should be no tariff cuts without eliminating or reducing the nontariff barriers that also impede the free flow of goods among countries. That's also true in NAFTA negotiations.

Among the nontariff barriers that trouble the industry are import quotas and licenses, import permits, and technical standards designed to favor domestic industries over imports. CMA believes NAFTA should allow only those governmental charges on imports that are consistent with GATT.

Although petrochemicals, investment, and tariffs rank high on the list of the industry's concerns about NAFTA, they certainly aren't the only ones. The chemical industry wants NAFTA to provide good protection for intellectual property rights. This would include comprehensive product and process patent coverage and a minimum of compulsory licensing.

It wants a dispute settlement process that is transparent, uncomplicated, and binding. The agreement also should specify a reasonable time limit for resolving disputes.

The U.S. chemical industry also wants NAFTA to provide strong "rules of origin" so that the benefits of liberalization go to the industries of the three countries and not to outsiders. Normally, such rules contain a "territorial value test." This test specifies that a certain percentage of a product's value must be added within the trade area to qualify for preferential tariff treatment.

Such a rule can be complicated, however. Witness the predicament Honda is in with the U.S. Customs Service over the cars it produces in Canada and exports to the U.S. To simplify the procedure, CMA proposes using a "tariff shift" test for chemicals listed in chapters 28 through 40 of the Harmonized Tariff System. If processing a chemical changes it from one tariff classification to another, it would be assumed that the new product automatically meets the territorial value test.

The Canadian and Mexican chemical industries feel the same way. In fact, CMA, the Canadian Chemical Producers' Association, and Mexico's Asociación Nacional de la Industria Química (ANIQ) have issued a joint policy statement on rules of origin for the NAFTA negotiations.

But just because the three trade associations representing their countries' chemical industries agree on something doesn't mean their negotiators also agree. One U.S. chemical trade expert close to the negotiations says Mexican negotiators aren't buying what ANIQ is selling on rules of origin. According to him, Mexican negotiators don't give as much credence to their private-sector advisers as U.S. and Canadian trade officials do.

In fact, virtually all of the chemical industry trade advisers in the U.S. give the U.S. Trade Representative's staff high marks for listening to, understanding, and acting upon their advice. "We couldn't be more pleased with our access to USTR," says CMA's O'Connor.

That doesn't mean that all of that advice will end up in the text of a NAFTA agreement. But at least it gets a sympathetic hearing.

The big question, of course, is will there be a NAFTA accord? And when? The goal was to complete the negotiations by the middle of this month so that the finished package could be sent to Congress with enough time for it to consider it before the elections in November. Given the status of the negotiations now, it will be tough to meet that schedule.

U.S. Trade Representative Carla Hills said recently that it was "absolutely mandatory" that the Administration send Congress a NAFTA text with all the details worked out, not just an outline of an agreement in principle. Some speculate that, even if a complete agreement is reached in this highly charged election year, President Bush may delay sending the agreement to Congress until next year—assuming, of course, that he is reelected. But Hills says she cannot conceive that the Administration would not send the text to Congress as soon as it is ready.

Since their "mega meeting" in Dallas in mid-February, the 19 NAFTA negotiating groups have been hammering away at the contentious issues involved in the negotiations. Considering that the negotiations are only one year old, says Hills, there has been good progress. But she concedes that each of the 19 groups has a difficult issue to cope with and that the energy group, which includes petrochemicals, is particularly difficult.

She also concedes there now is not enough time for Congress to consider an agreement under the formal "fast-track" timetable before the November elections. However, it's also possible that Congress may not need the full 90 calendar days allotted to consider an agreement.

So it's still not clear when—or if—there will be a NAFTA agreement. Meanwhile, chemical industry trade advisers will continue working closely with U.S. trade officials to help shape an agreement they can support.

O'Connor won't speculate on whether the chemical industry will end up supporting a NAFTA agreement when it surfaces. A decision on that support must await the final package that NAFTA negotiators come up with. Says O'Connor, "We started out putting all of our original lofty, but not unrealistic, goals on the table. When it [the negotiations] is over, we must evaluate where the process has taken us and decide if we are better off with the agreement than without it."

However, the Coalition for Trade Expansion recently sent a letter to President Bush expressing its concern that the NAFTA negotiations are not producing positive results in "key areas." CMA is one of 20 trade associations and other trade groups that are members of that coalition. □

Worldwide fibers output perks up slightly

World production of man-made fibers—which include both synthetics and cellulosics—last year rose slightly more than 1% from 1990 to a historic high of about 19.3 million metric tons, according to the annual fibers survey just released by Dutch chemicals and fibers producer Akzo.

Synthetic fibers, including polyester, nylon, and acrylic, accounted for 84% of the total production, 16.2 million metric tons, up from almost 15.9 million metric tons in 1990. Cellulosic fibers—mostly acetate and viscose fibers—fell to 16% of world production or 3.07 million metric tons, down from the 17% share or 3.22 million metric tons produced in 1990. In total, says Friedrich W. Fröhlich, president of Akzo's fibers division, man-made fibers make up more than half of all fibers consumed worldwide (the remainder is accounted for by natural fibers, such as cotton and wool). In industrialized countries, man-made fibers' share is more than two thirds.

According to Fröhlich, 1991 growth in man-made fiber production came from "other regions" outside the industrialized world, with those regions accounting for 54% of world production. Growth in these regions in 1991 was concentrated in Southeast Asia. In fact, he points out, Taiwan now produces more man-made fibers than either Japan or China. The production level of such nonindustrialized countries now is five times higher than it was 20 years ago, three times higher than current production in Western Europe, and nearly three times greater than in the U.S. now. (The Western Europe designation in Akzo's report comprises European Community countries including the former East Germany, and nations belonging to the European Free Trade Association.)

U.S. production of man-made fibers in 1991 was 3.72 million metric tons, essentially unchanged from 1990. Japan raised domestic production 1% to 1.82 million metric tons. In Western Europe, production declined 6% to 3.41 million metric tons, and that of Eastern Europe also fell. Fröhlich notes that "output in Eastern Europe is difficult to estimate, but it is certainly experiencing a downward trend." Akzo estimates this annual decline to be more than 10% in 1991, and company marketers glumly refer to that market as having disappeared.

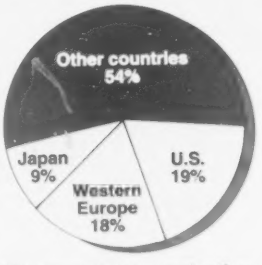
One of the factors contributing to the decline of production in Western Europe, Akzo believes, is that the region continues to be heavily targeted for imports. Imports into Western Europe last year reached a record level of 2.7 million metric tons, twice the level in 1985. At the same time, exports have declined. In addition, Western European export markets were hit as Southeast Asian producers substantially increased their capacities, becoming increasingly competitive in world markets.

According to the Akzo survey, the net 1% increase in man-made fibers came solely from growth in production of synthetic fibers, which rose 2%, especially on strong growth of polyester fibers. A 4% decline in production of cellulosic fibers was concentrated in Western and Eastern Europe.

Nylon, as well as cellulosics, lost ground in Western Europe, whereas other synthetic fibers, including acrylics, posted increases. In the U.S., cellulosics output was down slightly, and production of nylon and most other synthetics—particularly those used in the carpet industry—posted large declines. Only strong production in polyester fibers boosted net production into positive growth. In Japan, a slight decline in nylon fiber output was offset by increases in all other fiber types.

In fact, in 1991, of all synthetic fibers, only nylon showed a net output decline worldwide, the Akzo survey shows, falling to 23% of total world production of synthetic fibers from 24% the year before. Polyester had a good year, boosting share of worldwide production to 55% in 1991 from 54% in 1990. And acrylics production, which had been battered in 1990 because of a variety of fashion trends, increased, although its share of total worldwide output declined to 14% from 15% the year before.

Developing nations make half of world's fibers



1991 worldwide production of man-made fibers = 19.3 million metric tons

Source: Akzo

And for the category that Akzo calls "other synthetic fibers," which includes polypropylene and elastane fibers, production rose to 1.54 million metric tons from 1.34 million metric tons in 1990, or 8% of total 1991 production.

In reporting specifically on the performance of Akzo's fiber division, Fröhlich emphasizes the division "closed 1991 with black figures. This can certainly not be said about all of our competitors." Business was down, however. The summer, in particular, "was very bad, worse than we had expected," he says.

The division's sales in 1991 were $2.47 billion, down 12% from 1990. Operating profits were $59 million, a drop of 53%. And shipments were 337,000 metric tons through the year, down from 400,000 metric tons in 1990. Among the specific factors Fröhlich cites: recession in the major countries and industries in which the unit's customers operate; high imports; disappearance of Eastern European markets; export problems caused by unfavorable currency exchange rates; and high cost increases, especially with regard to labor costs.

Emphasis on viscose fibers, industrial fibers (particularly tire cord), and work force reductions are among Akzo's countermeasures. For example, it has reached agreement with the Treuhandanstalt, the German government agency charged with privatizing enterprises in the former East Germany, to assume management and sales at the textile viscose fiber plant at Elsterberg. According to Fröhlich, Akzo has a takeover option as well.

In tire cord, the company has elected to discontinue its steel cord production and concentrate on rayon and polyester cord. For example, last year it acquired Goodyear's polyester cord plant in Scottsboro, Ala.

And, in part by a discontinuation of some activities, it has reduced its work force by about 18% to 21,000 over the course of the year. By the end of 1992, Fröhlich adds, further reductions will take that to fewer than 20,000 employees.

Patricia Lauman

True Employment Situation for Chemical Professionals Uncertain

The American Chemical Society's Committee on Professional Relations (CPR) continues to be concerned that its long-established approach to investigating and reporting on mass terminations of chemical professionals may be understating the seriousness of unemployment among chemists, especially older ones.

CPR's latest report, the 33rd in a series dating back to 1974, details five such terminations involving 102 chemical professionals. But it also points out that 15 unverified terminations, involving as many as 250 people, are under investigation.

One of the particular concerns of CPR is the reluctance of individuals terminated to cooperate in such investigations. Another is the problem of differentiating between involuntary and voluntary terminations. Traditionally, CPR counts only terminations that are unambiguously involuntary. It does not count the apparently increasing number of chemists involved in recent years in early retirement and other schemes designed to encourage "voluntary" separation from an employer. As one chemist involved in such a situation reported to CPR, his termination was "voluntary but with no viable alternative."

CPR is also unhappy about a recent ruling of the Court of Appeals of the 2nd Circuit in New York City, that employers can fire older executives to trim costs if each termination is handled individually on its merits and is based solely on financial considerations. The committee describes the timing of this decision as "unfortunate."

The five mass terminations covered in the latest report range in size from 40 terminated workers at Henkel Research in Santa Rosa, Calif., down to seven terminees at Ciba-Geigy in Hawthorne, N.Y. The terminations occurred between October 1990 and March 1991. CPR defines a mass termination as a situation in which three or more chemical professionals are terminated within a six-

Employer compliance with ACS employment guidelines

These employers provided information	Approximate number of employees separated	Advance notice	Severance pay	Assistance	Employee service	Protection plans
Ciba-Geigy (Hawthorne, N.Y.)	7				▨	
Henkel Research (Santa Rosa, Calif.)	40		▨			▨
Mead Imaging (Miamisburg, Ohio)	23		▨			▨
Petrolite (St. Louis, Mo.)	13	▨			■	▨
This employer provided no information						
EniMont America (Monmouth Junction, N.J.)	19				na	▨

na = not available

□ Employer met or exceeded guideline standard.

▨ Two or more individuals below guideline standard, but average experience better than "substantially below" criterion.

■ Employer was substantially below guideline standard, which is defined as follows:

- Advance notice—less than four weeks.
- Severance pay—less than two weeks per year of service.
- Assistance—no assistance rendered.
- Employee service—more than 30% of terminees had 10 or more years of service.
- Protection plans—no continuation of protection plans.

ACS guidelines

• Advance notice. Four-week minimum.

• Severance pay. Minimum is two weeks per year of service. Additional notice may be given, by mutual agreement, in lieu of severance pay.

• Assistance. Efforts should be made to place terminee in another position within the organization, or terminee should be given assistance to find employment elsewhere.

• Employee service. Those with minimum of 10 years' service should not be terminated except for continued evidence of previously documented inadequate performance or cause.

• Employee protection plans. Should be extended for a minimum of one month, plus two weeks for each year of employee service, following termination, at same rate of contribution as before. Employee would have additional 31-day grace period.

month period for reasons other than properly documented inadequate performance, the end of a contract, or cause.

As is usual, CPR compared the performance of the employers involved in the five terminations with standards contained in ACS's Professional Employment Guidelines (PEG). Compliance was higher than usual, 63%. This compares with an average 41% for the previous 32 reports.

All five employers involved met the guidelines for assisting those fired in seeking other employment. At the other end of the compliance scale, only one employer met the PEG standard for extending health and other protection plans for a period beyond termination.

CPR requests that chemical professionals who have been fired or who have taken involuntary early retirement contact the American Chemical Society, Office of Professional Services, 1155—16th St., N.W., Washington, D.C. 20036. Copies of all CPR termination reports and of related C&EN stories are available, on request, from the same office.

Michael Heylin

Nominations sought for Stone Award

The ACS Carolina-Piedmont Section is requesting nominations for the Charles H. Stone Award. This award, which consists of a plaque, $1000 honorarium, and travel expenses to the award banquet and presentation, is given to a chemist in the ACS Southeast Region upon nomination and selection by the Stone Award committee.

Nominating material should include a letter of nomination, seconding letters, biographical sketch, and other supporting documents. Send to Paul Rillema, Department of Chemistry, University of North Carolina, Charlotte, N.C. 28223. All material should be received no later than May 15. □

Fellowship in rubber and polymer science

The ACS Rubber Division has announced the availability of its $10,000 Paul J. Flory Memorial Fellowship for a student now working toward a postgraduate-level education in rubber and polymer science. Originally established in 1988 to perpetuate the tradition of outstanding scientific research practiced by Nobel Laureate Paul J. Flory, the fellowship award is sponsored by the Education Committee of the Rubber Division.

Candidates may be nominated by a professor or a department active in graduate-level rubber and polymer science. Names of doctoral-level candidates should be submitted by May 31 with the following information: undergraduate and graduate transcript, a research proposal that describes anticipated project activity, candidate's statement describing how this endeavor would fit into his or her career plans, and recommendation from the thesis adviser.

For additional information contact Education Committee, ACS Rubber Division, P.O. Box 499, Akron, Ohio 44309-0499, phone (216) 972-7814. □

AWARDS

Special recognition to . . .

The American Institute of Chemical Engineers has presented several awards to honor outstanding contributions by chemical engineers. James E. **Bailey,** Chevron Professor of Chemical Engineering, California Institute of Technology, is the recipient of the 1991 Food, Pharmaceutical & Bioengineering Division Award. Bailey was cited as "an expert in biochemical engineering—specifically, the engineering of cells to improve their effectiveness in process applications." The award consists of a certificate and a $2500 honorarium.

John L. **Hudson,** Wills Johnson Professor of Chemical Engineering, University of Virginia, Charlottesville, has won the R. H. Wilhelm Award in Chemical Reaction Engineering for his contributions to chemical reaction research and education. Given annually, the $3000 award recognizes "significant and new contributions in chemical reaction engineering."

Robert **Langer,** Germeshausen Professor of Chemical & Biomedical Engineering, Massachusetts Institute of Technology, is the winner of the Charles M. A. Stine Award in Materials Engineering & Sciences. Author of some 275 technical publications and holder of 73 patents, Langer developed the first controlled-release systems for proteins and bioerodible polymers.

Michael L. **Mavrovouniotis,** assistant professor, University of Maryland's Systems Research Center and chemical engineering department, College Park, is being honored with the Ted Peterson Student Paper Award. An expert in computer-aided engineering of chemical and biochemical processes and systems, he is receiving the award for his paper, "Computer-Aided Synthesis of Biochemical Pathways."

John A. **McBride,** retired senior vice president, E. R. Johnson & Associates, Oakton, Va., is the recipient of the Robert E. Wilson Award in Nuclear Chemical Engineering. He was cited for "his expertise in process and product development and quality assurance related to nuclear engineering." McBride has 47 years of experience in the field, having served with Phillips Petroleum Co. and the U.S. Atomic Energy Commission before joining E. R. Johnson.

John R. **McWhirter,** professor of chemical engineering, Pennsylvania State University, has won the Arthur Dehon Little Award for Chemical Engineering Innovation. He is being recognized as an "expert in environmental engineering, gas-liquid mass transfer, and oxygen transfer in biochemical oxidation processes." Before joining the faculty at Penn State, he spent most of his career at Union Carbide, where he developed and marketed the UNOX process for improving wastewater treatment.

Donald F. **Othmer,** professor emeritus, Polytechnic University, Brooklyn, N.Y., is the winner of the 1991 Founders Award for Outstanding Contributions to Chemical Engineering. Othmer is well known for his pioneering work in designing chemical processes and manufacturing facilities for mass production of chemical products, as well as for his career as a chemical engineering educator. He is credited with helping to mass produce aspirin and cellulose acetate, and holds more than 150 domestic and foreign patents.

Michael L. **Shuler,** professor of chemical engineering, Cornell University, has received the Professional Progress Award for his accomplishments in bioreactor development for plant cell tissue cultures, for pioneering a new class of mathematical models for living cells, and for applied genetic engineering. Presented annually, the award consists of a $4000 honorarium and $500 travel allowance.

Richard D. **Siegel,** a principal and director of business development, ENSR Consulting & Engineering, Acton, Mass., is being honored with the T. J. Hamilton Memorial Award for Government Service for his expertise in environmental engineering—particularly in air pollution control

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